Alexandre Arkhipov
Moscow State University

Towards a more general model of interlinear text

ICLDC'2013 – Honolulu, March 1

OUTLINE

I Interlinear text model in [BBH 2003]

II Extensions

1 Axes

2 Alternatives

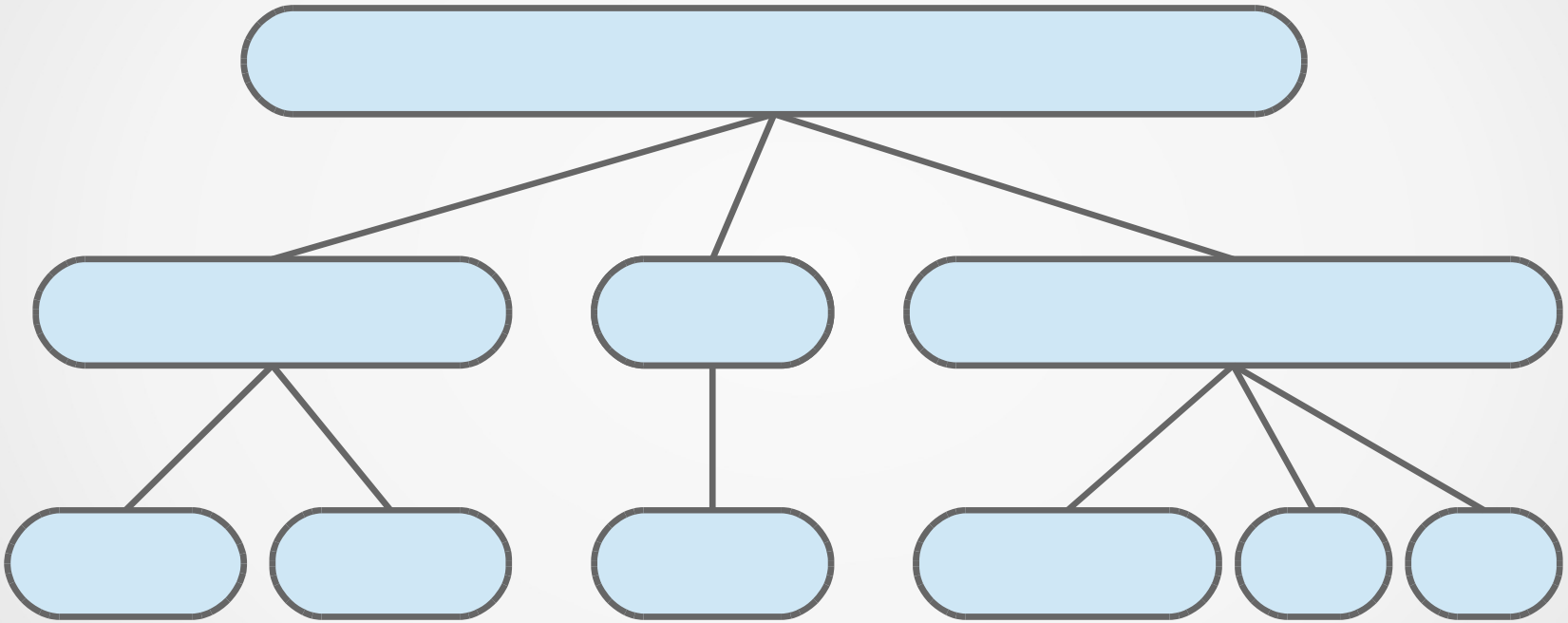
3 Multi-speaker and multi-lingual texts

4 Comments and versioning

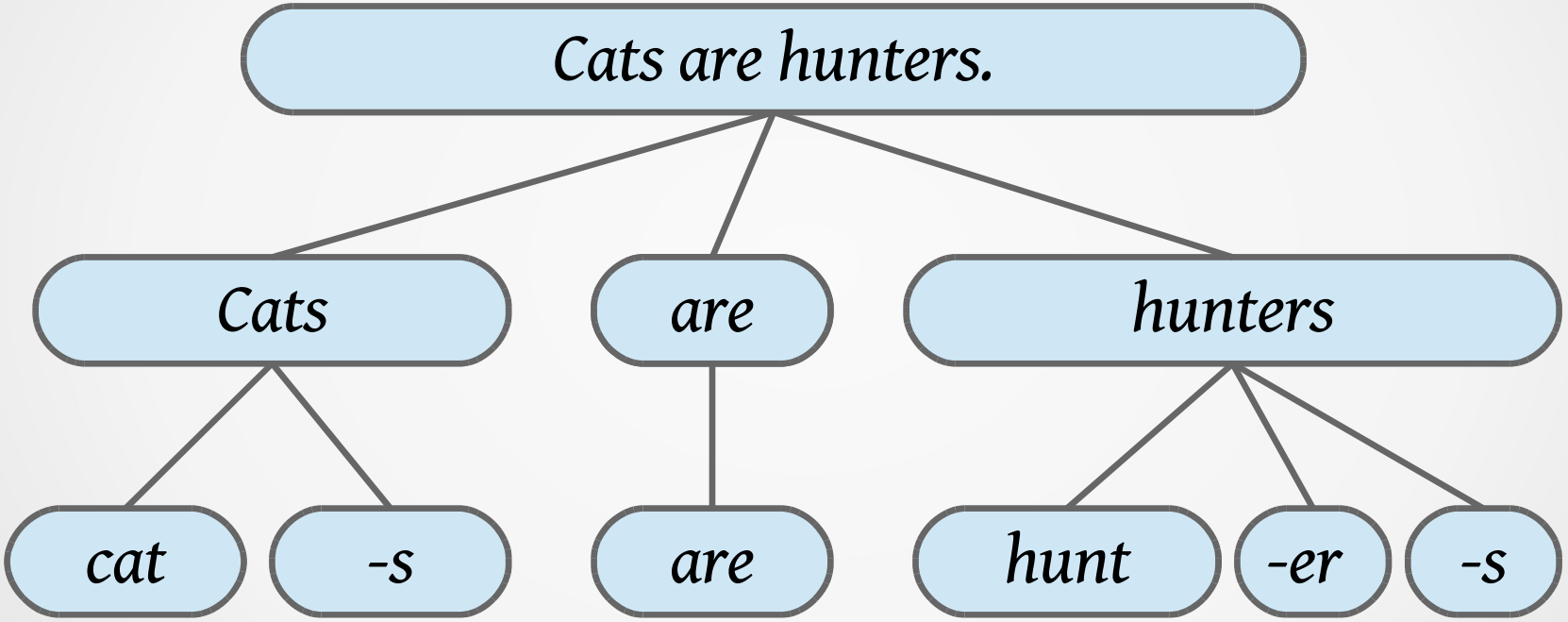
5 Non-linear markup (syntactic, semantic etc.)

III RDF back-end and LLOD perspective

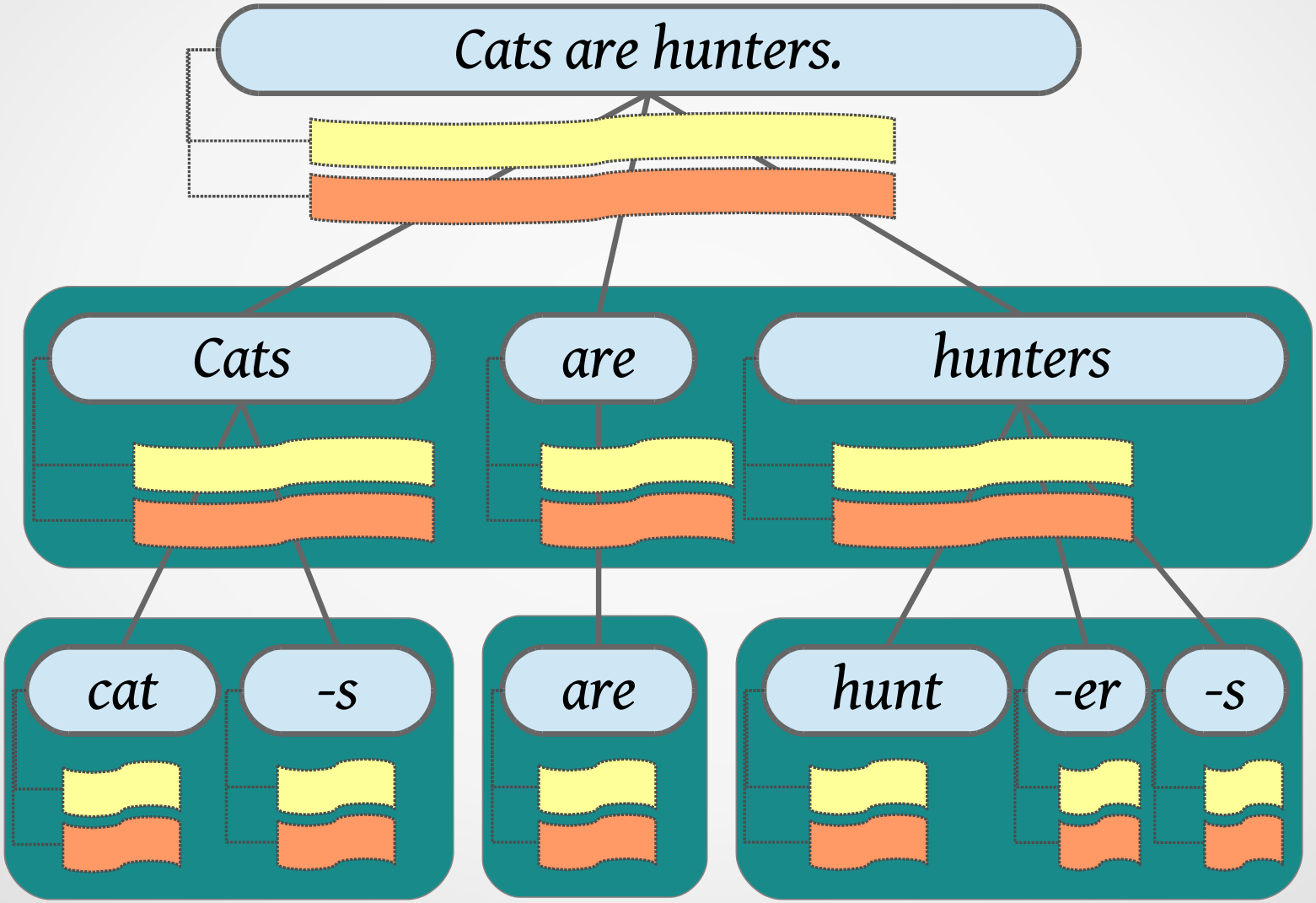
I. Interlinear text model in BBH 2003



I. Interlinear text model in BBH 2003



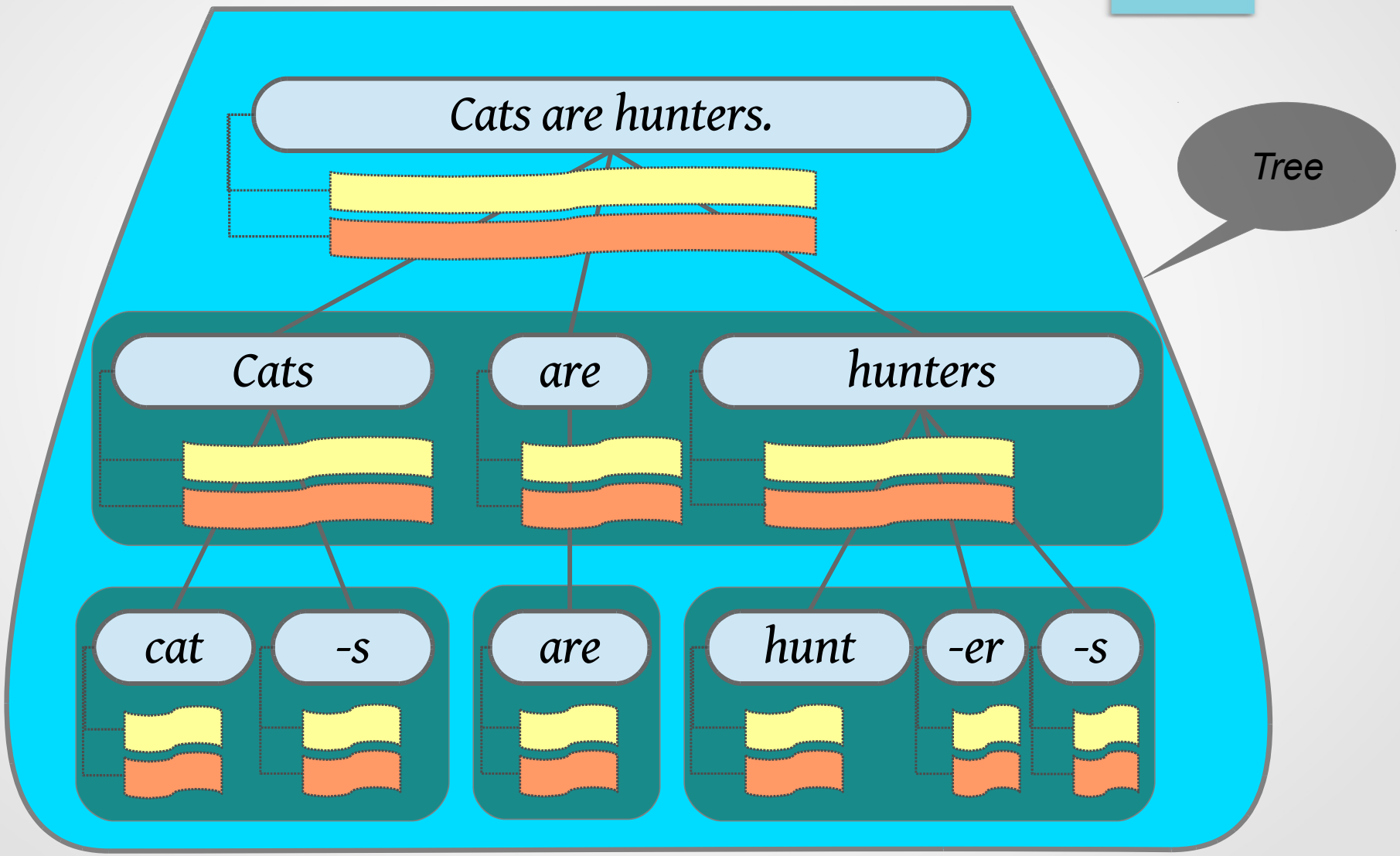
I. Interlinear text model in BBH 2003



II.1 From a tree to a set of trees

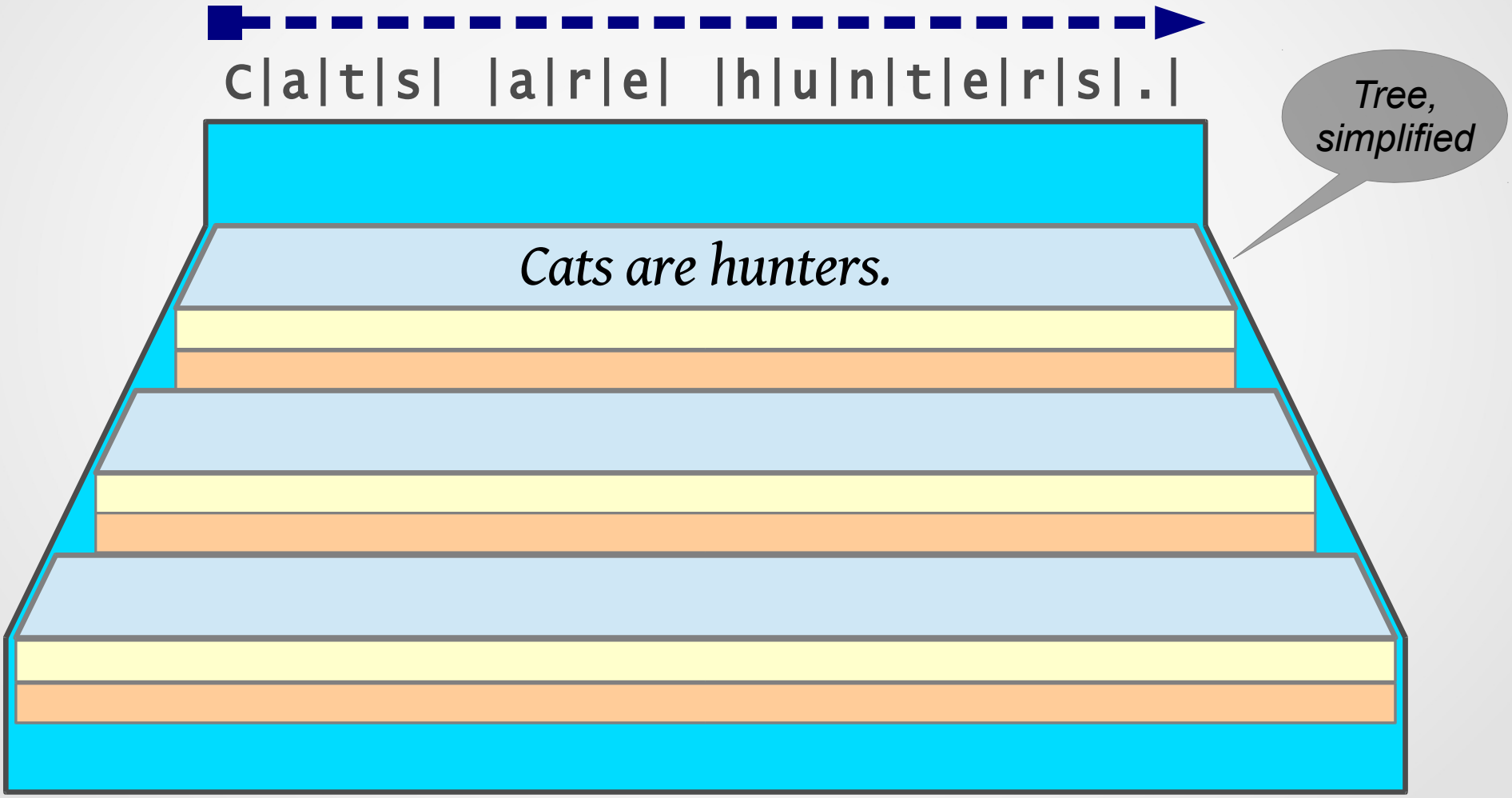
- An *interlinear-text* object is a tree
- An *interlinear-text* object is bound to an **axis**
  (its root annotation is obligatorily aligned to the axis, child annotations are possibly aligned too)

II.1 From a tree to a set of trees



II.1 From a tree to a set of trees

Interlinear-text is bound to an axis

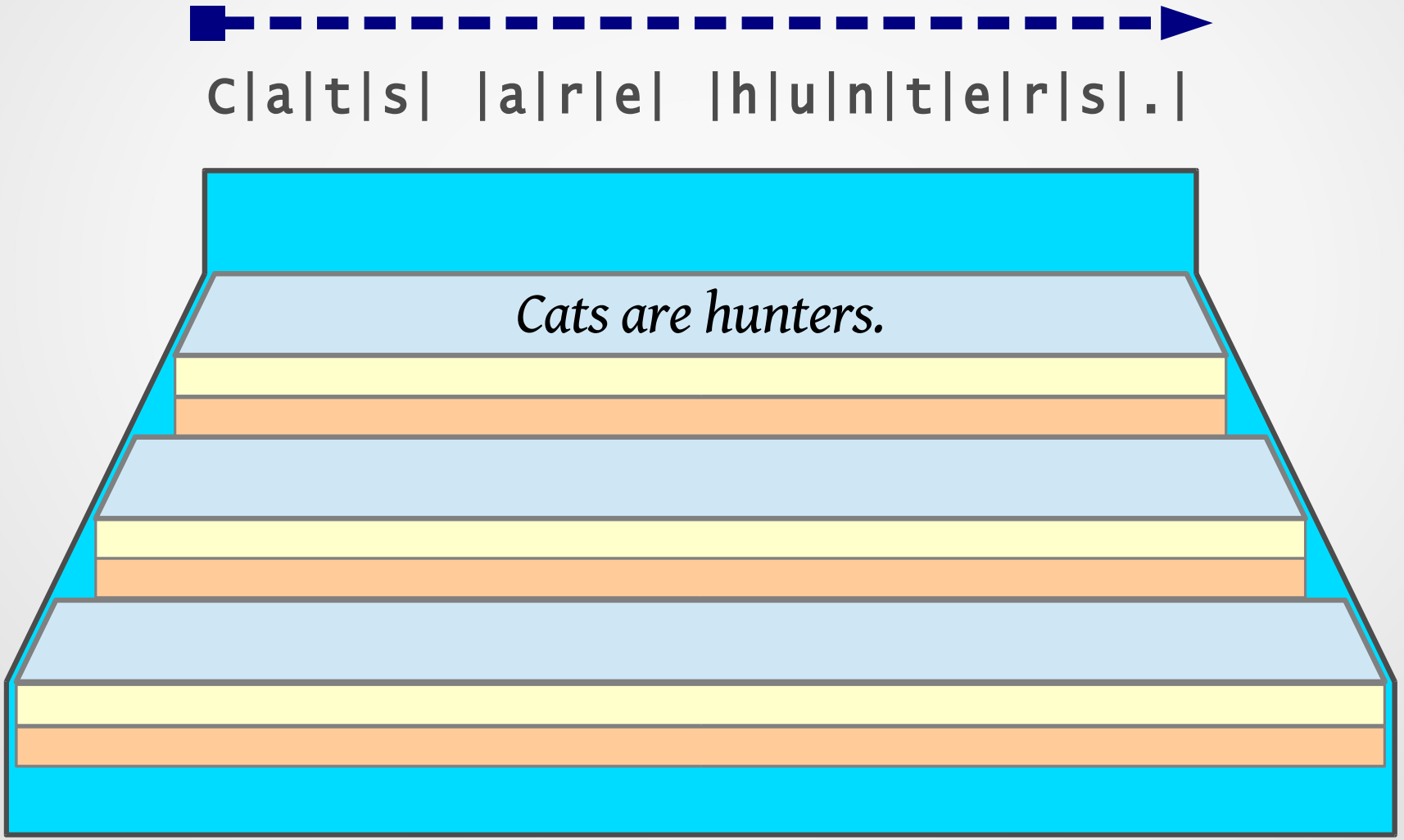


II.1 From a tree to a set of trees

- An *interlinear-text* tree is bound to an **axis**
- **More than one axis (and >1 tree) may be needed for a complete linguistic analysis of a text (speech event)**
- Each **axis type** can have its own **units** for fragment identification
- Axis types (+units)
  - Normalized (abstract) text: Plain text (character, line)
  - Transcribed text: Timeline (ms, digital samples)
  - Document: Graphic media (page + area)
  - Document: Formatting objects (page+block+char,line)
  - ...

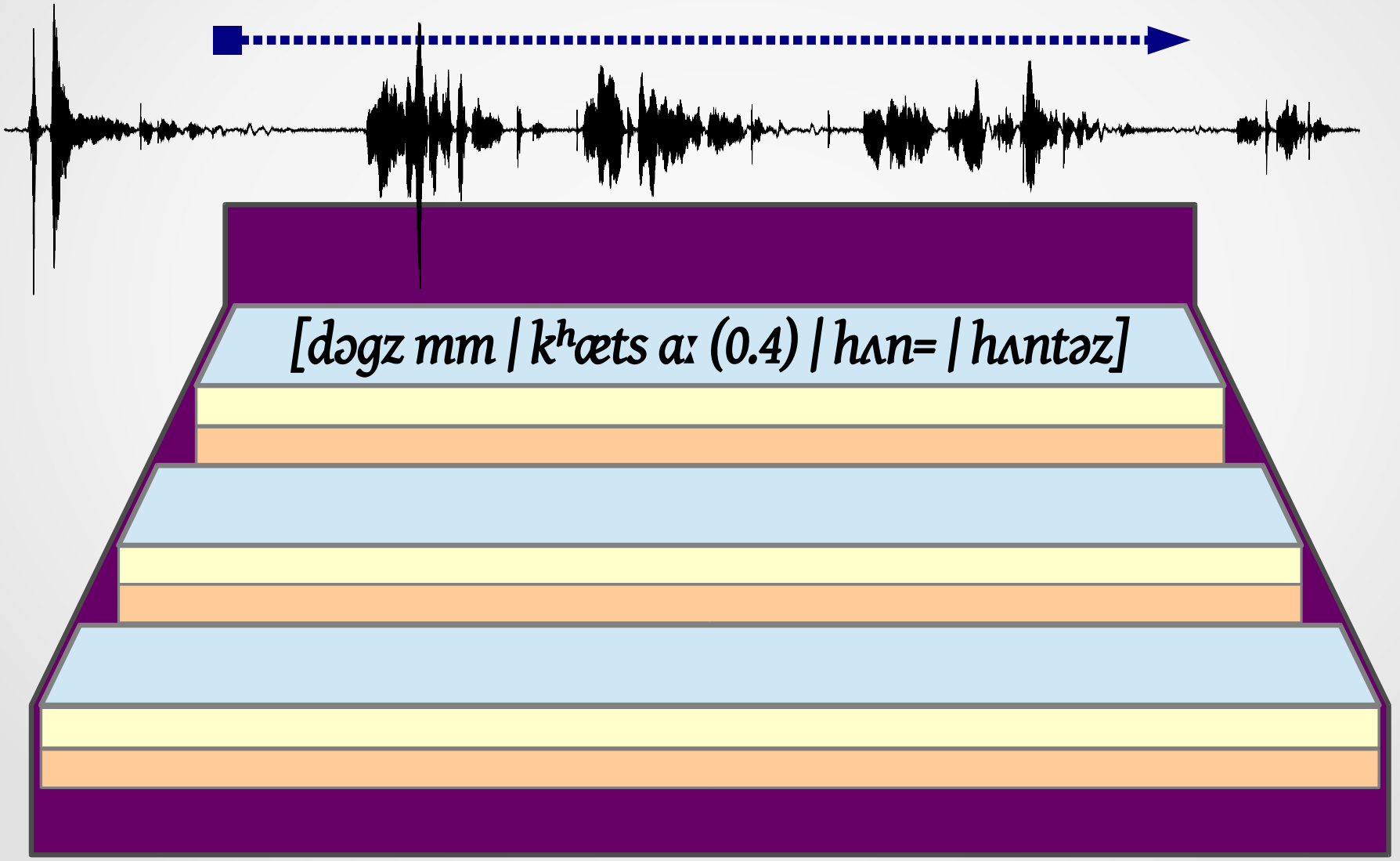
II.1 Axis types & units: Abstract text

Plain text axis (character, line)



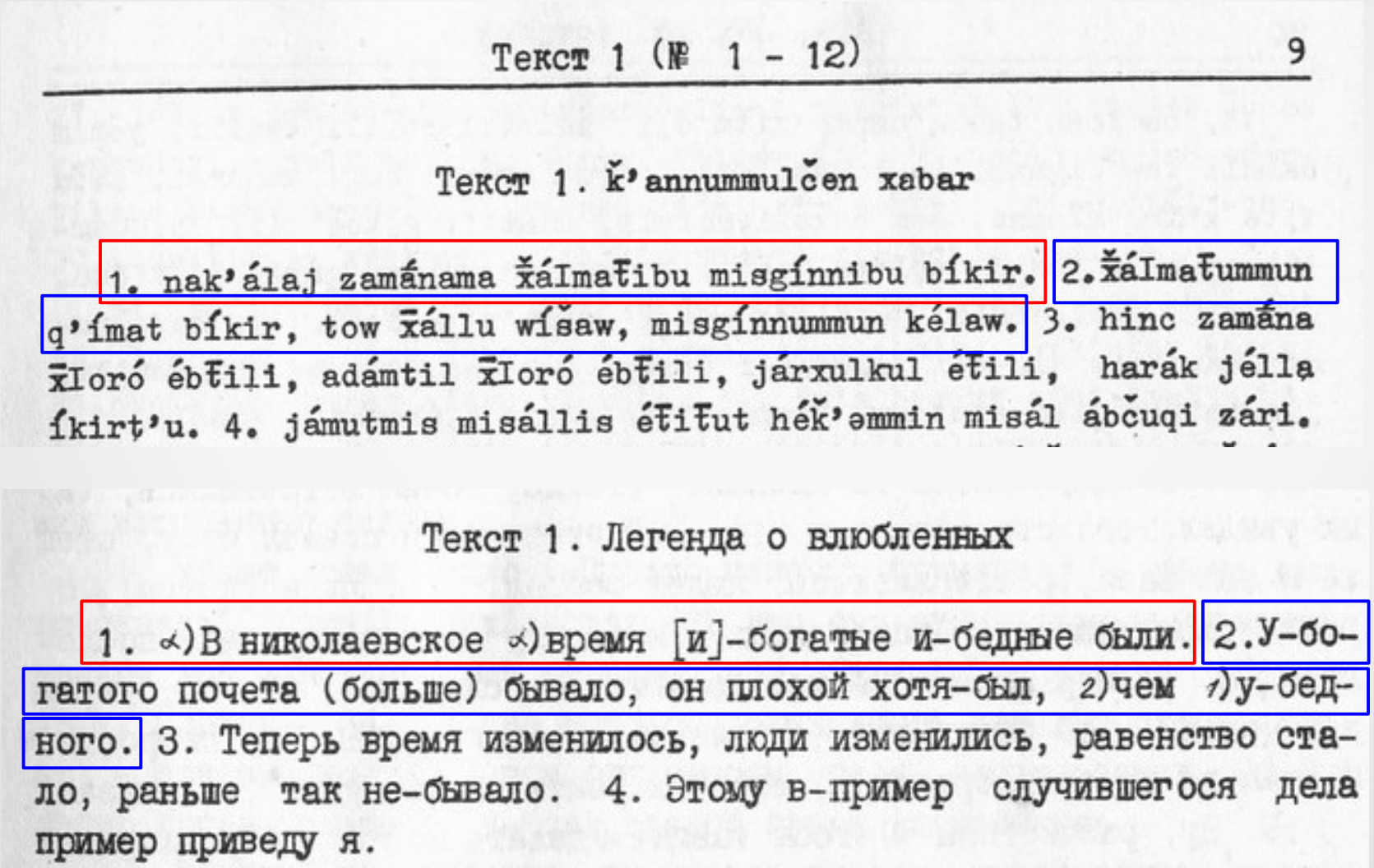
II.1 Axis types & units: Transcribed text

Timeline (ms, digital samples)



II.1 Axis types & units: Document

Graphic media (page + area)



Текст 1 (№ 1 - 12) 9

Текст 1. ǩ'annummulčen xabar

1. nak'álaj zamánama x̌áImaṯibu misgínnibu bíkir. 2.x̌áImaṯummun q'ímat bíkir, tow x̄állu wíšaw, misgínnummun kélaw. 3. hinc zamána x̄Ioró ébṯili, adámtil x̄Ioró ébṯili, járxulkul étili, harák jélla íkirṯ'u. 4. jámutmis misállis étiṯut héǩ'əmmin misál ábčuqi zári.

Текст 1. Легенда о влюбленных

1. а)В николаевское а)время [и]-богатые и-бедные были. 2.У-богатого почета (больше) бывало, он плохой хотя-был, 2)чем 1)у-бедного. 3. Теперь время изменилось, люди изменились, равенство стало, раньше так не-бывало. 4. Этому в-пример случившегося дела пример приведу я.

II.1 Bundle of axes

Inter-axis alignment

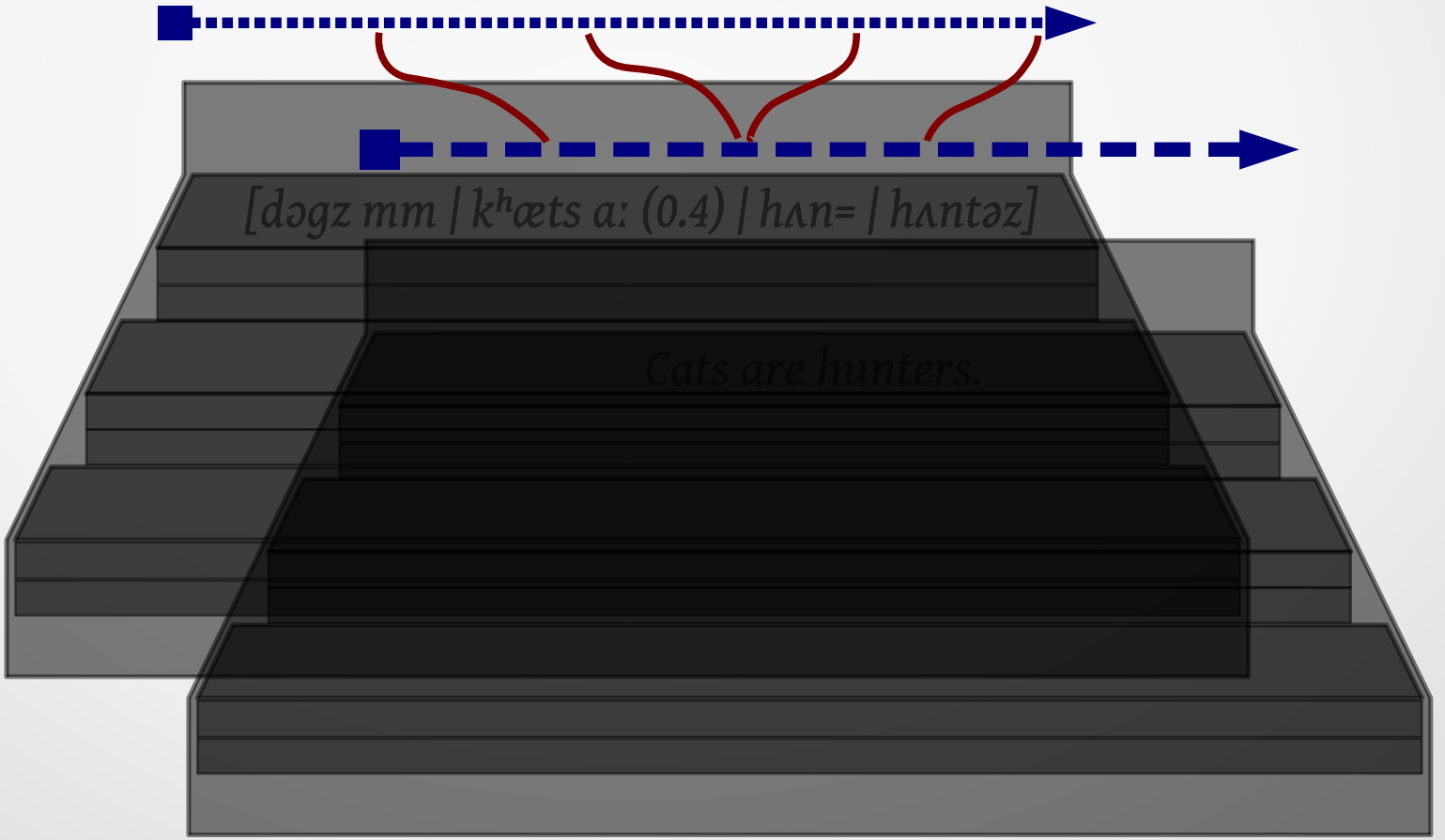
Annotations in one axis can be aligned to (annotations in) another axis, e.g.:

- (abstract) text segments aligned to transcription segments / timeline
- BOLD-style audio annotations: sound fragments of different duration aligned to each other
- sign languages aligned to spoken language translations
- retelling a movie/cartoon: segments aligned to corresponding video fragments

II.1 Bundle of axes

Inter-axis alignment

Annotations in one axis aligned to (annotations in) another axis



II.2 Alternative analyses

Alternative analyses of all kinds, including root annotations (e.g. alternative transcriptions; lexical and morphological homonymy; syntactic ambiguity) need to be stored and displayed as such

- Each alternative creates a divergence point (alternative subtrees)
- Support for feature-labeling of alternatives
  Marking divergence points for user-specified «features» allows to select for review e.g. all *open*/*close* vowel alternatives, or all *Perfect* vs. *Evidential* alternatives in a corpus
- «Feature values» for consistent choice of alternatives
  Marking each subtree for the particular analysis choice yielding this subtree allows to simultaneously settle e.g. all *open*/*close* vowel alternatives to *close* in one action

II.2 Alternative analyses

Features for marking alternatives

An example for ambiguity in transcription: full vowel vs. schwa

```
<word wordID="A1.P1.U3.W4">
    <item type="txt" lang="aqc__IPA">nədo</item>
</word>
<alt altID="a123" targetID="A1.P1.U3.W4">
    <alt-default>
        <alt-feature alt-fname="vowel reduction" alt-fvalue="schwa"
agreeID="11"/>
    </alt-default>
    <alt-option>
        <alt-feature alt-fname="vowel reduction" alt-fvalue="full" agreeID="11"/>
            <word wordID="A1.P1.U3.W4">
                <item type="txt" lang="aqc__IPA">nodo</item>
            </word>
    </alt-option>
</alt>
```

«schwa» option (default)

«full vowel» option

II.3 Multi-speaker and multi-lingual texts

- Multi-speaker texts are easily accounted for by introducing a "participant" attribute on segments
- Multi-lingual texts are easily accounted for by introducing a "language" attribute on segments
  - Indispensable for correctly dealing with code-switching
  - also for quotations, borrowings etc.
- ➔ Note: in current versions of SIL FLEx this cannot be done since each project can only hold data for one language (even if the xml format allowed)
- ➔ From the application point of view, texts are better stored independently of grammar/lexica

II.4 Comments and versioning

- Every piece of data can have associated comments
- Every piece of data can have associated attributes like confidence levels, grammaticality judgements (esp. for elicited texts but not only), workflow stages and assignments («check sound», «check grammar», «for John to approve» etc.)
- Every piece of data can have metadata attributes (created/edited by, created/edited timestamp etc.) and thus allow tracking of changes and version control

II.5 Non-linear markup

The basic interlinear setup is designed principally for morphological annotation, most importantly for linear annotation.

A more general format must allow for non-linear kinds of markup as well (e.g. dependency trees, constituency trees) necessary for full-scale syntactic or semantic analysis.

Grouping of (non-)contiguous elements (e.g. periphrastic forms) should also be supported.

Thus the model must support annotations as relations between annotations, overlaid upon the «basic» interlinear tree.

III. RDF back-end and LLOD

A fully-detailed XML implementation is possible but extremely complex. Moreover, for any particular editing / management / analysis application only a part of the whole data structure would probably be relevant.

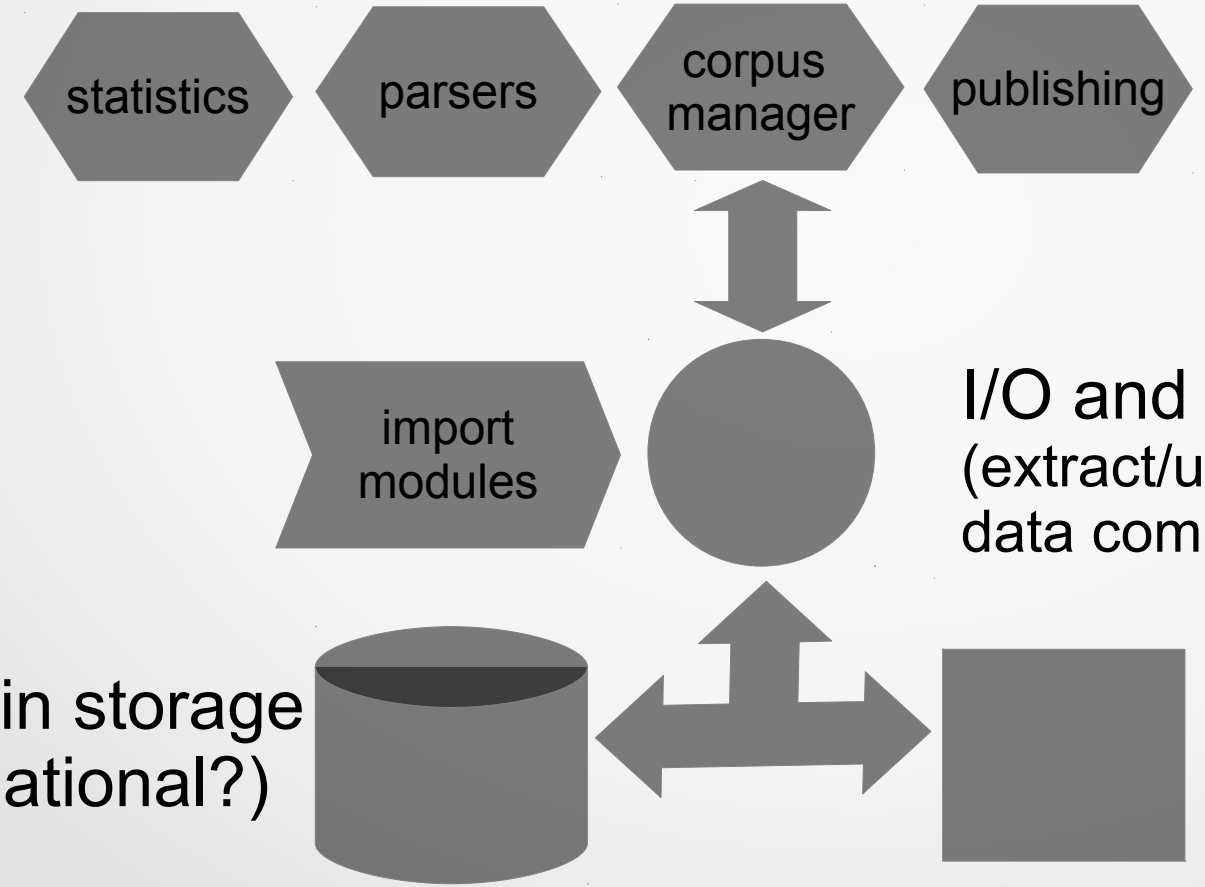
Thus one can envisage a complex system which uses different data formats for different purposes, cf. S. Moran's PHOIBLE project [Moran 2012] (relational DB + huge flat plain text file + RDF/OWL repository).

RDF is also a natural solution in the LLOD perspective (Linguistic Linked Open Data, see [Chiarcos et al. 2011]).

An RDF-like intermediary triple repository is also proposed for ELAN-FLEx interoperability (see Nakhimovsky's presentation)

III. RDF back-end and LLOD

The aim is to design a system as outlined below:



References

BBH 2003 — Cathy Bow, Baden Hughes and Steven Bird. 2003. Towards a General Model of Interlinear Text.

Moran 2012 — Steven Moran. 2012. Phonetics Information Base and Lexicon. Ph.D., U. of Washington.

Nakhimovsky et al. 2012 — Alexander Nakhimovsky, Jeff Good, Tom Myers. 2012. Interoperability of Language Documentation Tools and Materials for Local Communities // *Digital Humanities 2012.*

Chiarcos et al. 2011 — Christian Chiarcos, Sebastian Hellmann, Sebastian Nordhoff. 2011. Towards a Linguistic Linked Open Data cloud: The Open Linguistics Working Group // TAL v.52 no.3, pp. 245-275.